

## 299-E28-54 (A6805) Log Data Report

### Borehole Information:

<b>Borehole:</b> 299-E28-54 (A6805)		<b>Site:</b> 216-B-9 Crib			
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b> n/a <sup>2</sup>	<b>GWL Date:</b> n/a		
<b>North (m)</b>	<b>East (m)</b>	<b>Drill Date</b>	<b>TOC<sup>3</sup> Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
136813	573849	07/48	686.25	150	cable tool

### Casing Information:

<b>Casing Type</b>	<b>Stickup (ft)</b>	<b>Outer Diameter (in.)</b>	<b>Inside Diameter (in.)</b>	<b>Thickness (in.)</b>	<b>Top (ft)</b>	<b>Bottom (ft)</b>
Steel (welded)	2.0	8.644	8	0.322	0	150

### Borehole Notes:

The drilling depth, casing depth, and date of drilling are derived from *Hanford Wells* (Chamness and Merz 1993). The casing size information for the 8-in. steel casing is confirmed from tape and caliper measurements collected in the field by Stoller personnel. The coordinates and TOC elevation are derived from HWIS<sup>4</sup>.

### Logging Equipment Information:

<b>Logging System:</b> Gamma 2B	<b>Type:</b> SGLS (35%)
<b>Calibration Date:</b> 11/01	<b>Calibration Reference:</b> GJO-2002-287-TAR
	<b>Logging Procedure:</b> MAC-HGLP 1.6.5, Rev. 0

<b>Logging System:</b> Gamma 1C	<b>Type:</b> HRLS
<b>Calibration Date:</b> 02/02	<b>Calibration Reference:</b> GJO-2002-309-TAR
	<b>Logging Procedure:</b> MAC-HGLP 1.6.5, Rev. 0

### Spectral Gamma Logging System (SGLS) Log Run Information:

<b>Log Run</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4 Repeat</b>	
Date	03/19/02	03/20/02	03/21/02	03/21/02	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth	2.0	150.0	52.0	42.5	
Finish Depth	44.0	51.0	43.0	29.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	n/a	n/a	n/a	n/a	
Pre-Verification	B0105CAB	B0106CAB	B0107CAB	B0107CAB	

Log Run	1	2	3	4 Repeat	
Start File	B0105000	B0106000	B0107000	B0107019	
Finish File	B0105084	B0106198	B0107018	B0107046	
Post-Verification	B0105CAA	B0106CAA	B0108CAA	B0108CAA	

### **High Rate Logging System (HRLS) Log Run Information:**

Log Run	1	2	3	4 Repeat	
Date	05/08/02				
Logging Engineer	Spatz				
Start Depth	17.0				
Finish Depth	24.0				
Count Time (sec)	300				
Live/Real	L				
Shield (Y/N)	N				
MSA Interval (ft)	0.5				
ft/min	n/a				
Pre-Verification	AC014CAB				
Start File	AC014000				
Finish File	AC014014				
Post-Verification	AC014CAA				

### **Logging Operation Notes:**

Spectral gamma logging with the SGLS was performed in this borehole during March 2002 in three days; HRLS logging was performed in May 2002. Logging measurements are referenced to the top of the 8-in. casing. A repeat section with the SGLS was collected in this borehole to measure logging system performance.

### **Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	07/29/02	<b>Reference:</b>	
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Pre-run and post-run verification spectra met acceptance criteria for both the HRLS and SGLS. The verification data files utilized for the energy and resolution calibration necessary to process the SGLS data were the post-run for log runs 1 and 2 and the pre-run for log runs 3 and 4; the post-run was utilized for the HRLS.

A casing correction for 0.322-in.-thick casing was applied to the log data for the 8-in. steel casing.

Log spectra were processed in batch mode using APTEC Supervisor to identify individual energy peaks and determine count rates. Concentrations were calculated with Excel worksheet templates identified as G2BNOV01.xls and G1CFEB02.xls for the SGLS and HRLS, respectively, using efficiency functions and corrections for casing and dead time determined during calibrations. Where SGLS dead time exceeded 40 percent, the HRLS data were substituted.

### **Log Plot Notes:**

Separate log plots are provided for the man-made radionuclides ( $^{137}\text{Cs}$  and processed uranium [ $^{238}\text{U}$  and  $^{235}\text{U}$ ]) detected in the borehole, naturally occurring radionuclides ( $^{40}\text{K}$ ,  $^{238}\text{U}$ ,  $^{232}\text{Th}$  [KUT]), a combination of man-made, KUT, total gamma and dead time, and a repeat section. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do

not include errors associated with the inverse efficiency function, dead time correction, or casing corrections.

### **Results and Interpretations:**

$^{137}\text{Cs}$  and  $^{238}\text{U}$  (processed uranium) were the only man-made radionuclides detected in this borehole. Significant  $^{137}\text{Cs}$  concentrations were measured between about 18 and 34 ft in depth. The maximum  $^{137}\text{Cs}$  concentration measured about 4,000 pCi/g at 20.5 ft. At the total depth of the borehole, the concentration is about 240 pCi/g, indicating the contamination has not been completely penetrated by the borehole.

Processed uranium is identified by the 1001-keV energy peak of metastable protactinium-234 ( $^{234\text{m}}\text{Pa}$ ) that is used to assay the man-made  $^{238}\text{U}$  concentration and the 186-keV energy peak of uranium-235 ( $^{235}\text{U}$ ).  $^{234\text{m}}\text{Pa}$  was detected near its MDL, which infers a  $^{238}\text{U}$  concentration of about 17 pCi/g at 56.5 ft and between 65.5 and 66 ft.  $^{235}\text{U}$  concentrations were not detected above their MDL of about 0.6 pCi/g at any depth although slightly elevated counts in the 186-keV energy peak were observed at 66 ft.

Changes in the  $^{40}\text{K}$  concentrations from near 12 pCi/g at 19 ft to about 18 pCi/g at 25 ft suggest a transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The repeat log data section acquired from the 29-42 ft depth interval shows good repeatability of logging depth and concentration calculations.

### **References:**

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

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<sup>1</sup> GWL – groundwater level

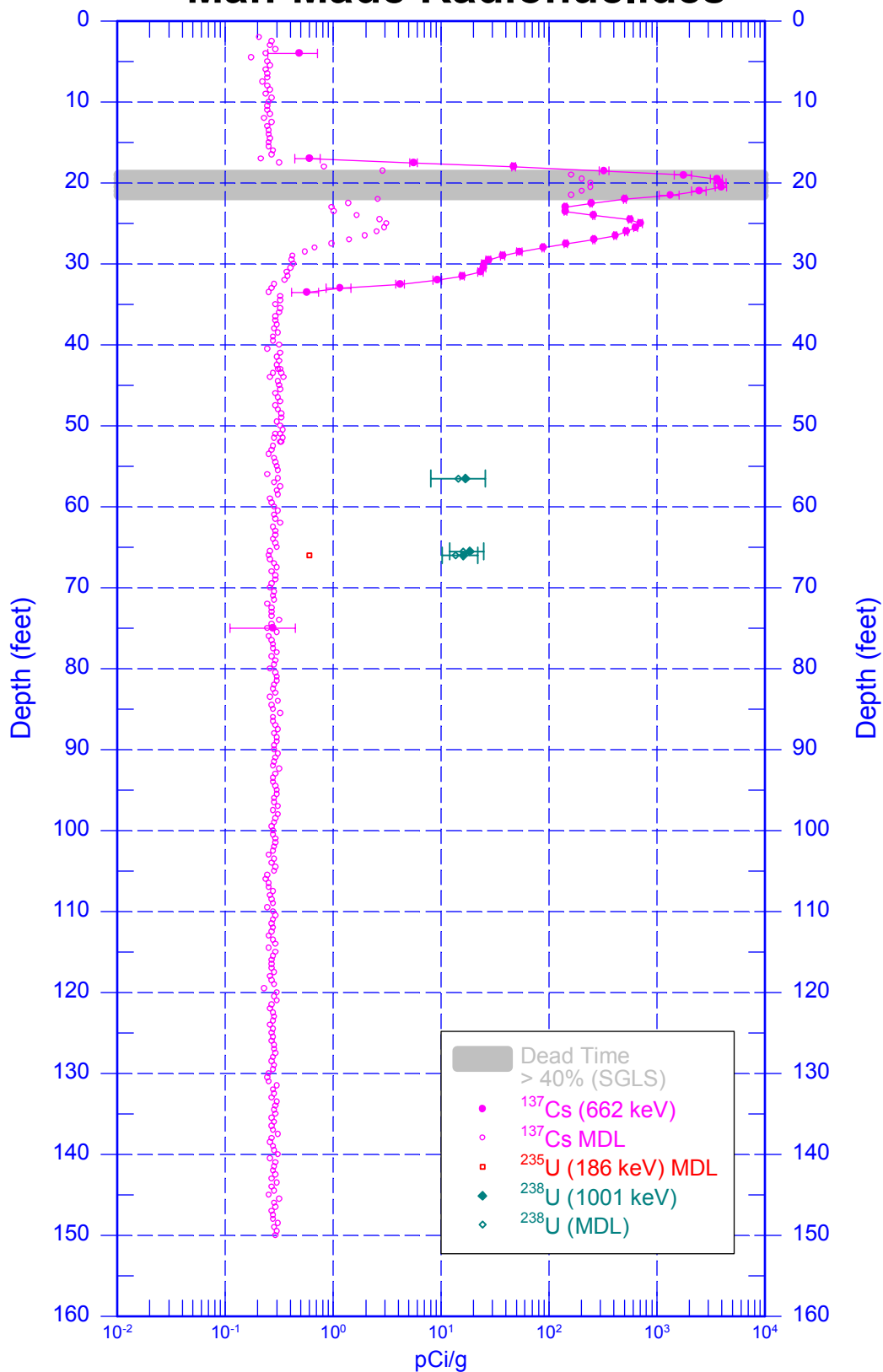
<sup>2</sup> n/a – not applicable

<sup>3</sup> TOC – top of casing

<sup>4</sup> HWIS – Hanford Well Information Systems

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## Man-Made Radionuclides

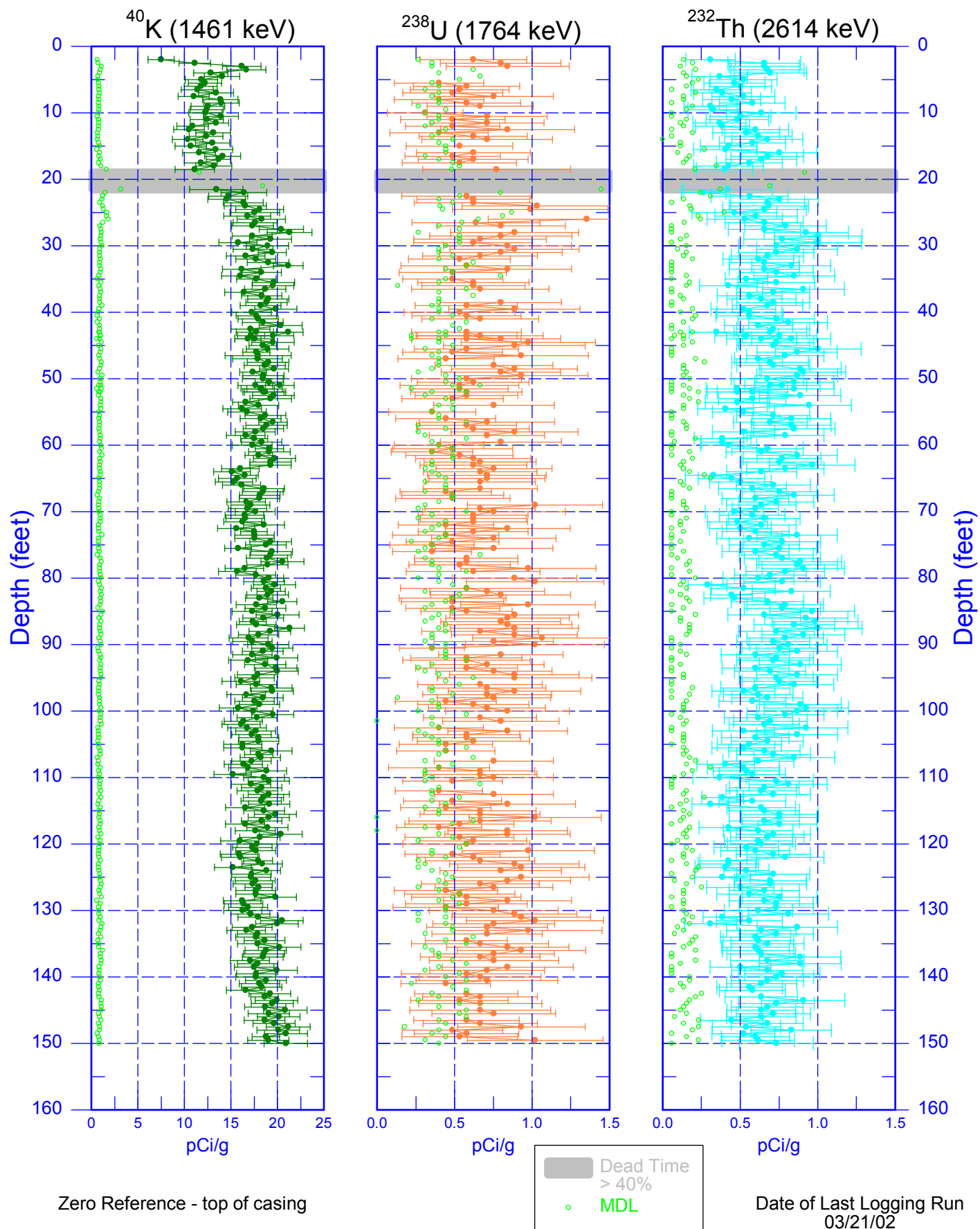


Zero Reference - Top of Casing

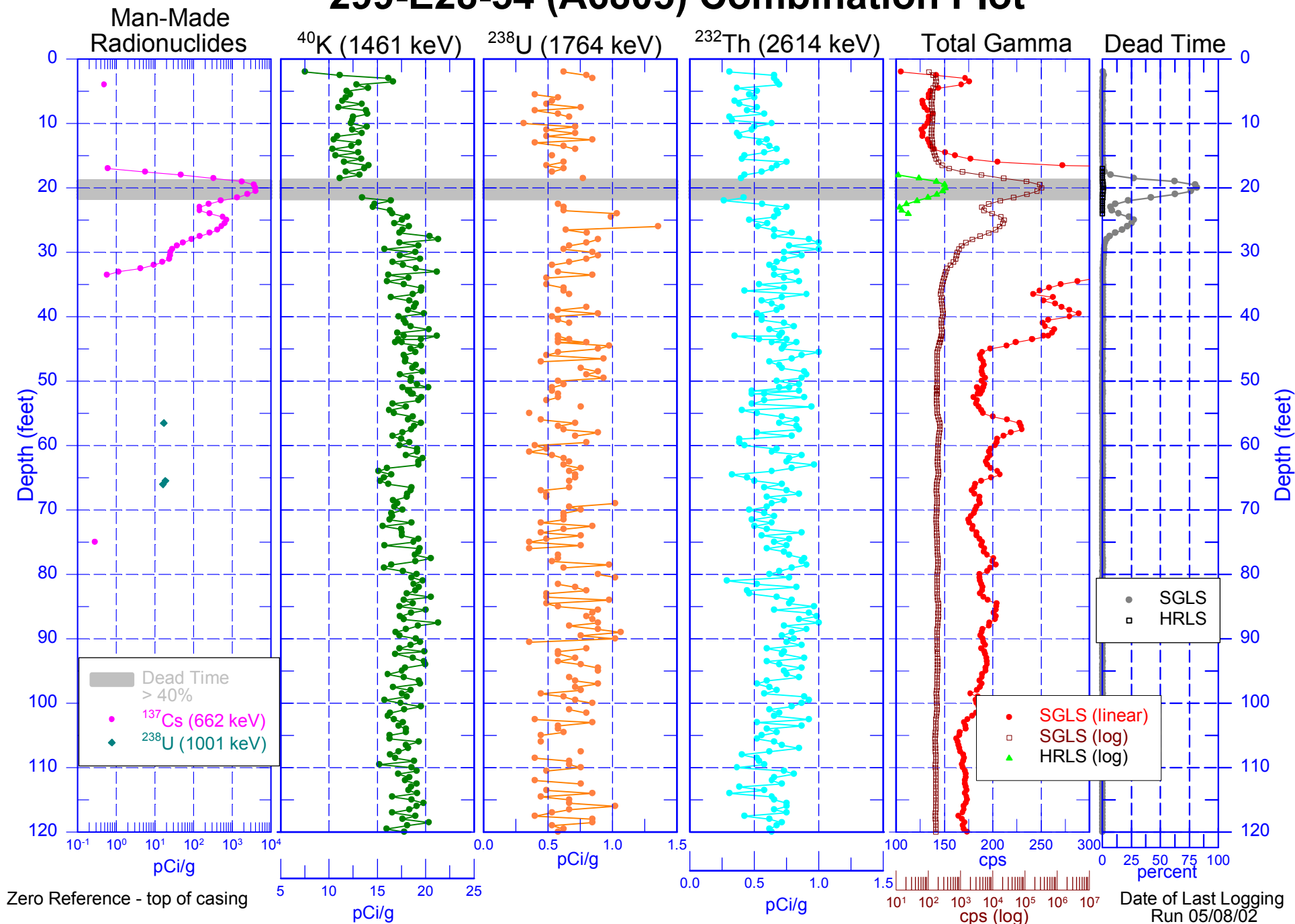
Date of Last Logging Run  
05/08/02

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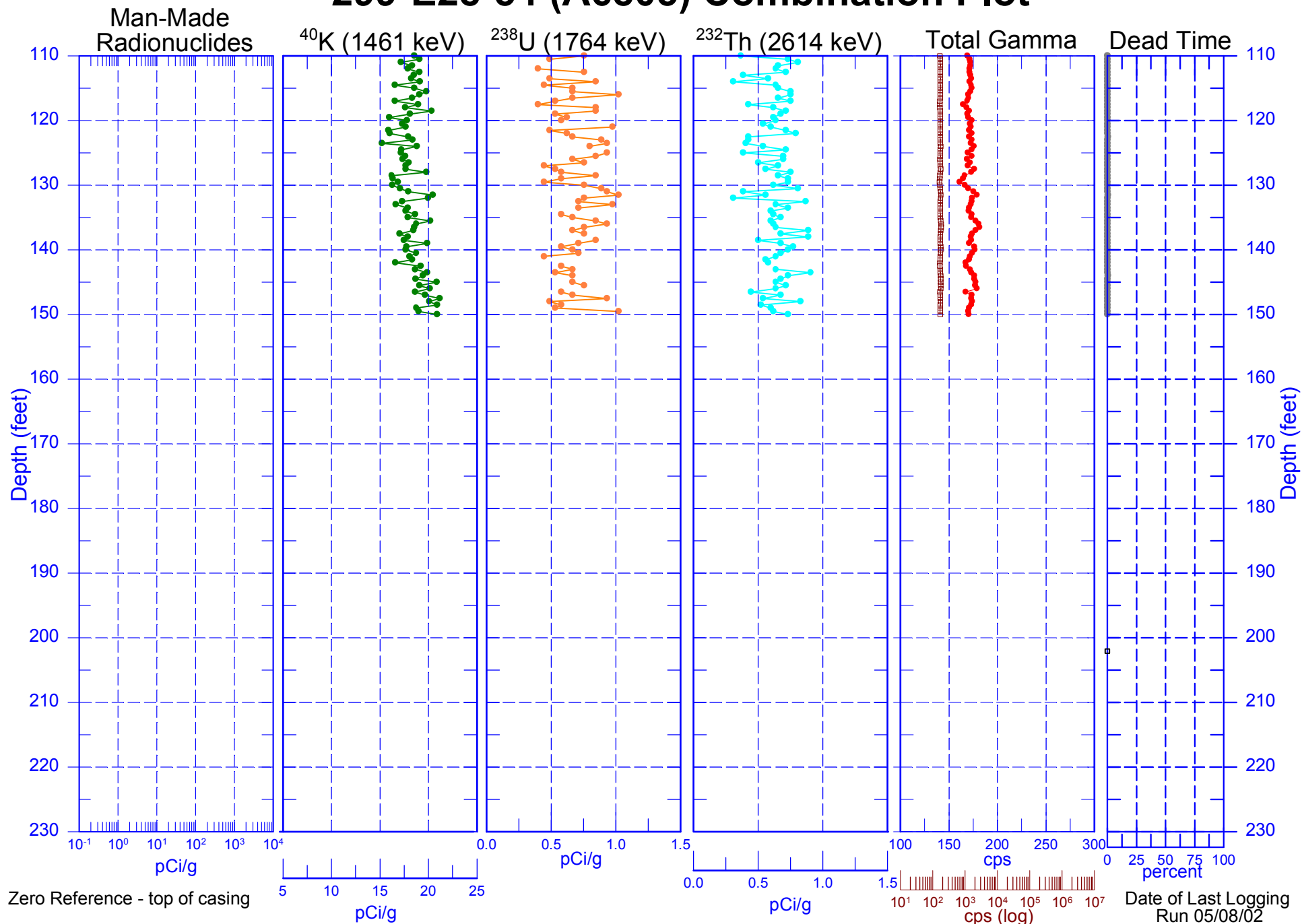
## Natural Gamma Logs



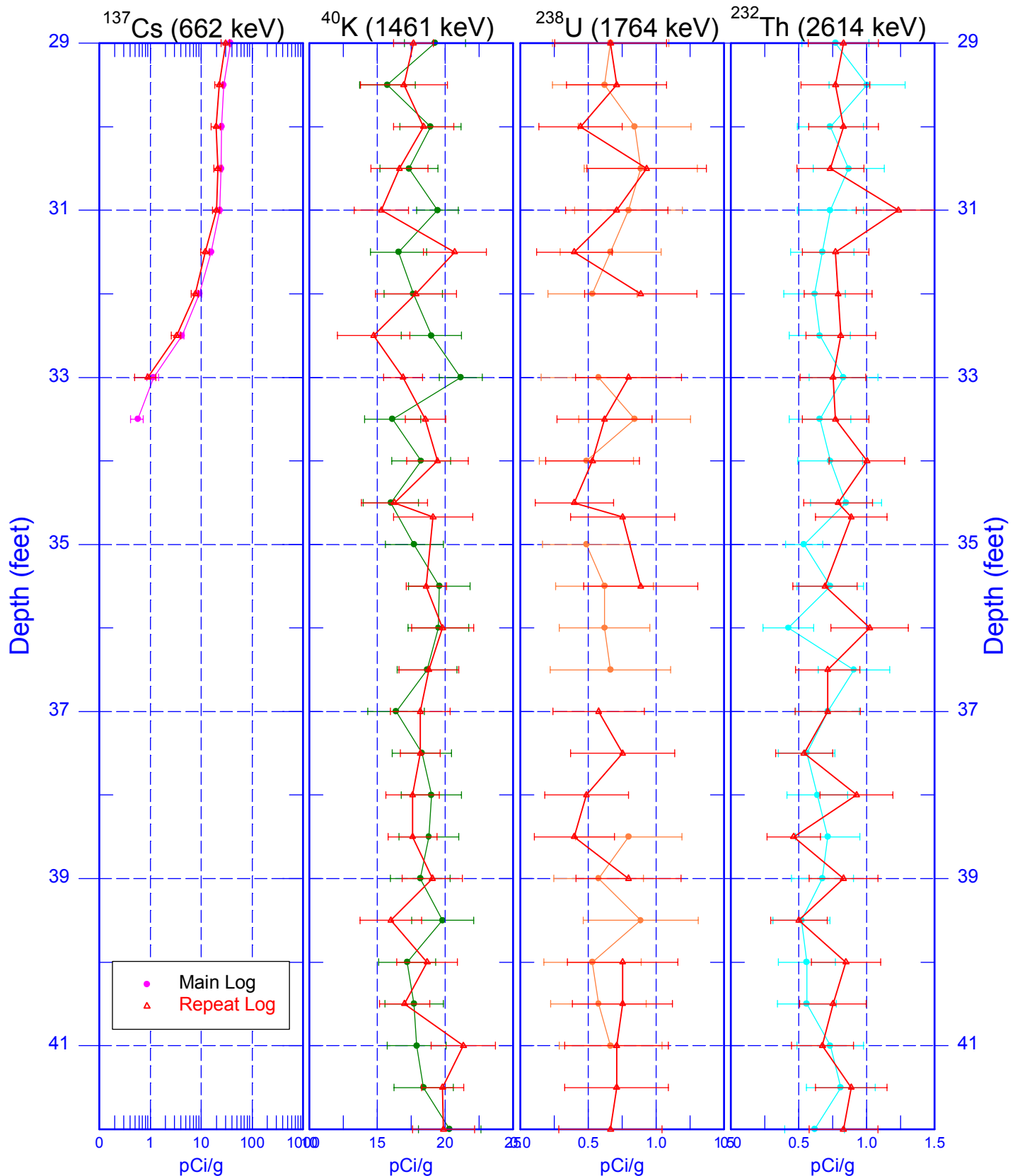
# 299-E28-54 (A6805) Combination Plot



# 299-E28-54 (A6805) Combination Plot



# 299-E28-54 (A6805) Repeat Log Section



Zero Reference - top of casing

Date of Last Logging Run  
03/21/02